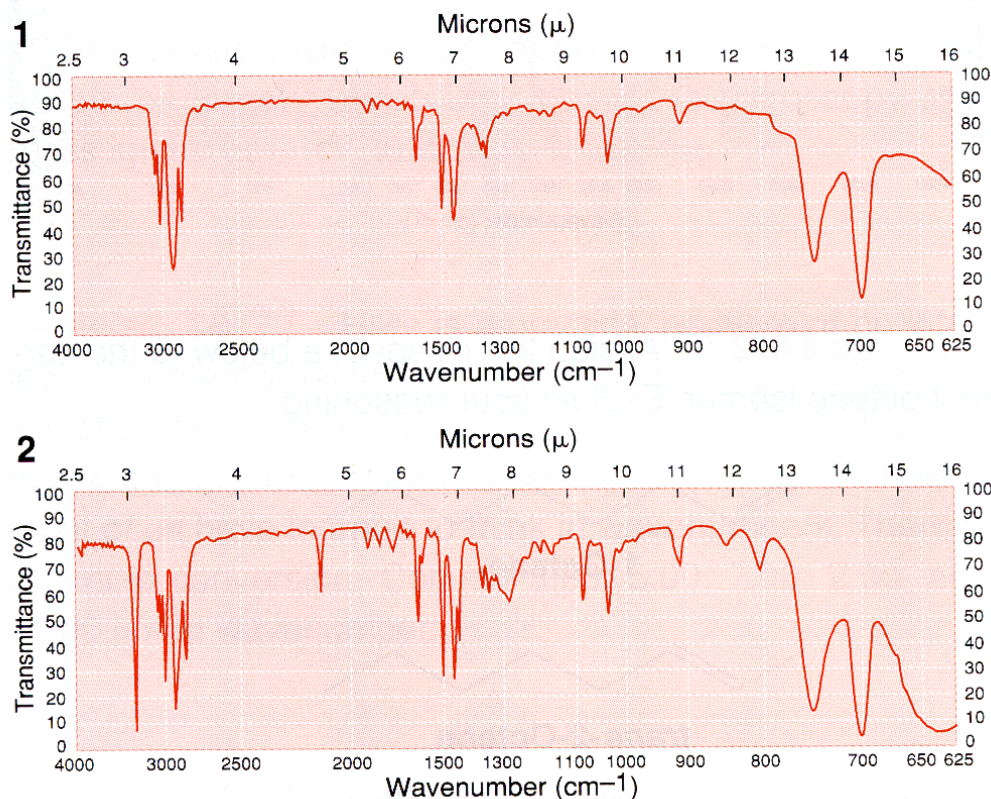


1. The IR spectra below belong to 5-phenyl-1-pentyne and 6-phenyl-2-hexyne. Which is which? Explain your reasoning.



2. Compound **C** is asymmetric, has molecular formula  $\text{C}_5\text{H}_{10}\text{O}$ , and contains two methyl groups and a  $3^\circ$  functional group. It has a broad infrared absorption band in the  $3200\text{--}3550\text{ cm}^{-1}$  region and no IR absorption bands between  $1690\text{--}1750\text{ cm}^{-1}$  and  $3000\text{--}3100\text{ cm}^{-1}$ . (a) Propose a structure for **C**. (b) Is your suggested structure capable of stereoisomerism? If so, can you determine from the data provided which stereoisomer Compound **C** represents?
3. An optically active compound **D** has the molecular formula  $\text{C}_6\text{H}_{10}$  and shows a sharp peak at  $3300\text{ cm}^{-1}$  in its IR spectrum. On reaction with excess  $\text{H}_2$  over catalytic Pt **D** yields **E** ( $\text{C}_6\text{H}_{14}$ ). Compound **E** is optically inactive and cannot be resolved. Propose structures for **D** and **E**.